

Aquifer Exemption Evaluation

Regulatory Agency: Colorado Oil and Gas Conservation Commission (COGCC) 1425 Program

Date of Aquifer Exemption Request: 08/18/2019

Substantial or Non-Substantial Program Revision: Non-Substantial

Basis for Substantial or Non-Substantial Determination: This AE Request is considered non-substantial, consistent with EPA Guidance 34

Operator: Peterson Energy Operating, Inc.

Well Class/Type: Class II SWD Well

Well/Project Name: Church 41-25

Well/Project Permit Number: Church 41-25

Well API number: 05-121-10858

Field: Rush Willadel

Tribal Reservation: No

Well/Project Location: Qtr/Qtr: NENE Section: 25 Township: 3 South Range: 51 West

Footage Call: 1121 feet from (N) line 973 feet from (E) line

County: Washington

State: Colorado

Latitude: 39.76902

Longitude: -103.03231

DESCRIPTION OF PROPOSED AQUIFER EXEMPTION (depths are approximate values at the well bore)

Aquifer to be Exempted: J Sand **Top:** 4010 feet **Bottom:** 4030 feet

Lithology: Sandstone, fine-medium grained, sub angular to sub rounded, clean friable

Water Quality – TDS (mg/L): 1480 mg/L **Source of WQ Data:** Church production facility treater water outlet

Areal Extent and Description of Exempted Aquifer (i.e. radial distance, encompassed TSR)

Total Area of Aquifer to be Exempted: 320 Acres

Description: Legal description of area to be exempted: NE/4 Section 25 and S/2 SE/4 Section 24 Township 3 South, Range 51 West, and W/2 NW/4 section 30, Township 3 South, Range 50 West

Confining Zone(s):

Upper: Carlile Shale	Lithology: marine shale	Top: 3438'	Bottom: 3560'
Upper: Greenhorn Lime	Lithology: marlstone, limestone, shale	Top: 3560'	Bottom: 3648'
Upper: Graneros Shale	Lithology: marine shale	Top: 3648'	Bottom: 3856'
Upper: D Sand	Lithology: fine grained fluvial sand shale sequence	Top: 3856'	Bottom: 3872'
Upper: Huntsman Shale	Lithology: black marine shale	Top: 3872'	Bottom: 3898'
Lower: Skull Creek Shale	Lithology: silty shale	Top: 4030'	Bottom: 4193'

BACKGROUND

USDW(s): One domestic use water well within a ½ mile radius.

Injectate Characteristics: Produced water from surrounding D & J Sand formation oil wells. Analysis is similar to water in the proposed injection well.

BASIS FOR DECISION

Regulatory Criteria under which the exemption is requested

An aquifer or a portion thereof which meets the criteria for an underground source of drinking water may be determined to be an exempted aquifer if it meets the criteria is 146.4(a) AND 146.4(b) or (c). The purpose of the bullets beneath each criterion is to ensure that appropriate and adequate information is collected to facilitate review of AE requests, and documentation of AE decisions. Some information described here may not apply to all AE requests.

146.4 : **X (a)** Not currently used as a drinking water source and:

- How far from the AE boundary to review drinking water wells and how was this determined? Approximately 2305' to nearest water well from COGCC/DWR records.
- Identify drinking water wells in area of review, their depths, and provide source of information. None within AE.
- Identify any source water assessment and/or protection areas and designated sole source aquifers. The Church 41-25 lies within the Northern High Plains Designated Basin and within the CDPHE Regulation 42 – 49B confined groundwater in D and J sands aquifer area classified as “Limited use and Quality”.
- Identify nearest public water supply (PWS). Greater than 5 miles from the AE.
- What is the distance of the nearest drinking water well utilizing the aquifer proposed for exemption? No drinking water wells are known to exist in the J Sand formation in Washington County.
- Is it in close enough proximity to require a capture zone analysis? No.
- Provide map of AE boundary and location of drinking water wells. See Attached.

X (b)(1) It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or Class II operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible; or

- Projections on future use of the proposed aquifer.

Hydrocarbon Production Data:

- Demonstrate historical production having occurred in the project area or field. See attached decline curves and annual production summary for 2 wells closest to proposed injection well.
- Demonstrate existence hydrocarbon (logs, core data, etc) and estimation of the quantity of the hydrocarbon potential. See attached Production History on the proposed Church 41-25 injection well and the two closest wells on the lease.

Mineral Resources Available:

- A summary of logging which indicates that commercially producible quantities of minerals are present, a description of the mining method to be used, general information on the mineralogy and geochemistry of the mining zone, and a development timetable.

X(b)(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or

- Projections on future use of the proposed aquifer. Oil Production.
- Current sources of water supply in the area of the proposed exempted aquifer. See attached list and map of water wells outside proposed AE but within ½ mile radius.
- Availability, quantity and quality of alternative water supply source(s) to meet present and future needs. The existing water supply wells in the area are more than adequate to meet current and future expected needs.

- Population trends in the area and analysis of future water supply needs within the general area. An increase in the water demand is not anticipated due to the sparse population, remoteness of the area, and no economic drivers promoting growth in the area.
- Well construction and water transportation and/or treatment costs to develop aquifer proposed for exemption compared to costs to develop alternative resource(s). To drill and complete a water well in the J sand formation and then treat the water would cost in excess of \$1,000,000. The shallow groundwater wells in the area can be drilled and equipped for less than 5% of that cost.

X(b)(3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

- Projections on future use of the proposed aquifer. Oil production is the only use in the future for the J Sand in this area.
- Concentrations, types, and source of contaminants in the aquifer. Chlorides, sulfates, BTEX, hydrocarbons.
- If contamination is a result of a release, extent of contaminated area and whether contamination source has been abated. NA
- Ability of treatment to remove contaminants from ground water. Treatment would include centrifuge, reverse osmosis, softening, and filtering.
- Current sources of water supply in the area of the proposed exempted aquifer. Shallow alluvial domestic water supply wells.
- Availability, quantity and quality of alternative water supply source(s) to meet present and future needs. Abundant.
- Population trends in the area and analysis of future water supply needs within the general area. The area is very sparsely populated with no increase in population density anticipated.
- Well construction and water transportation and/or treatment costs to develop aquifer proposed for exemption compared to costs to develop alternative resource(s). To drill and complete a water well in the J sand formation and then treat the water would cost in excess of \$1,000,000. The shallow groundwater wells in the area can be drilled and equipped for less than 5% of that cost.

☐ (c) TDS is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

- Projections on future use of the proposed aquifer.
- Include information about the quality and availability of water from the aquifer proposed for exemption.
- Analysis of the potential for public water supply use of the aquifer. This may include: a description of current sources of public water supply in the area, a discussion of the adequacy of current water supply sources to supply future needs, population projections, economy, future technology, and a discussion of other available water supply sources within the area.

Describe what assurance exists to confine fluids within the AE boundary:

- Discuss injection rate or volume limitation: The proposed injection rate is no more than 1000 BWPD. The 320 acre AE contains over 7.7 million barrels of available pore space for water storage in the J Sand. At the proposed injection rate, it would take over 20 years for injected water to reach past the boundary of the AE.
- Discuss existence and quality of confining zone(s). The J Sand is bounded above and below by competent shales as described above, which provide an adequate barrier to upward and downward fluid migration.
- (Is the confining zone continuous, are there known fractures?) The zones are continuous for many miles, with no known fractures.

Public Comment

Public Comment Conducted? ☐ Yes **X** No

Results of Public Comment Process: NA

Questions for Consideration

- ☐ Are there deeper aquifers with poorer quality water that can be used for injection (disposal wells)? **No**
- ☐ Proximity to other jurisdictional boundaries? **NA**
- ☐ Is seismicity a concern in the area? **No**

- ☐ Will injection of fluids cause any original formation fluid or injectate to migrate to any known USDW? **No**
- ☐ Are all wells within the AE boundary and AOR properly cemented to prevent preferential flow paths? **Yes**

Provide other considerations to support aquifer exemption approval:

Water has been injected into the J Sand in Washington County for over 50 years, with no known fluid migration out of zone or contamination of drinking water aquifers.

There are multiple other AEs in the township.